Improved Performance through the use of Defined Metrics

by Penny Dennehy

The Boeing Company
Background

- Airline metrics exist today (DAL, AAL, UAL, JAL, GECAS, CAL, KLM, UPS, FedEx, BAB, etc.)
- Initiatives of Six Sigma, ISO 9000, LEAN, establish performance metrics
- Challenges – internal measurement vs. external measurement (OEM to Airline, OEM to sub-tier supplier)
- For health of Aerospace industry, metrics are all part of the supplier/customer relationship
Industry Metric Initiative

Objective

- To develop a common set of ground rules and defined parameters for the aerospace industry/trading partners to measure performance

- Utilize an industry standard – Spec 2000

- Ensure metrics are consistent, simple and understandable
<table>
<thead>
<tr>
<th>Category</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality System</td>
<td>Quality Culture</td>
<td>Supplier Maturity Matrix</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality Performance</td>
<td>Product Performance</td>
<td>Special Action Documents</td>
<td>Service Bulletin Quality</td>
<td>Number of Rejects</td>
</tr>
<tr>
<td></td>
<td>Specification Performance</td>
<td>Quality Problem Alerts</td>
<td>Aircraft Quality</td>
<td>Defects per Million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service Performance</td>
<td>Client Support</td>
<td>Delivery (Spares)</td>
<td>Maintenance/Mod Issues</td>
<td>Lead Time</td>
</tr>
<tr>
<td></td>
<td>Delivery</td>
<td></td>
<td></td>
<td>Delays/Cancellations</td>
</tr>
<tr>
<td>Warranty Issues</td>
<td>N/A</td>
<td>Number of Claims</td>
<td>Number of Claims</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cycle Time</td>
<td>Cycle Time</td>
<td></td>
</tr>
<tr>
<td>Service Bulletins</td>
<td>N/A</td>
<td>S/B - Hours Inaccurate</td>
<td>S/B Data Integrity</td>
<td>N/A</td>
</tr>
<tr>
<td>Best Practices</td>
<td>Initiative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Innovation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Responsiveness</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strategic Section</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creative Solutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tech/Non Tech Support</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Metrics Philosophy

Ideal Metrics are:
- Important to Customer
- Traceable
- Quantifiable
- Credible
- Well defined
- Show performance over time
- Strategic to the business
Ideal metrics for the User are:

- Actionable
- Timely & Accessible
- Simple & Understandable
- Able to drive appropriate behavior

Metrics Philosophy
To be determined by each user **ACCOUNTABILITY**:
- Metric Owner (the person who manages the charts)
- Targets
- Sources of the data
- Who collects and manages the database (data-sources)
- The configuration of the charts
- Who produces the charts
- Project Integrator

**Why the metric is valuable**
- General statement of why it is important
- QFD result reference

**What does the metric depict**
- What process does this metric relate to?
- This is a description of the metric
- What does each plot point depict?

**How is the metric constructed**
- What are the data elements (ref. where they are defined)
- What are the criteria to include data elements in the calculated plot points
- What calculations produce the metric
Participants Included...

- Aeroxchange
- Air Canada
- Airbus
- American Airlines
- Air Transport Association (ATA)
- British Airways
- Boeing
- Cathay Pacific
- Crane Aerospace
- Delta
- Eaton Aerospace
- Emirates
- FedEx
- GE Transportation
- Goodrich
- Hamilton Sundstrand
- Honeywell
- KLM
- Moog
- Northwest Airlines
- Parker Aerospace
- Pratt & Whitney
- Qantas
- Rockwell Collins
- Rolls Royce
- Smiths Aerospace
- Southwest
- Thales Avionics
- UPS
Industry Comments

“I want to share my belief that this is an extremely important initiative for the industry, let alone Air Canada. When one considers that this can and should be standardized so that we can accurately compare "apples to apples" to benchmark things other than price, the value becomes quite clear. ... Rating systems that are open and transparent to either side of the relationship (buyer or seller) are the only ones that will provide value. If we continually "spin" numbers to project an appearance of high or even reasonable achievement when another perspective may reveal something quite different, the system is not very useful.”

Air Canada, Doug Ellis
ATA Spec 2000

Introducing Chapter 13

Performance Metric Standards
Six Key Process Metrics

Metric = A common set of ground rules and defined parameters

- Component Removal/Reliability
- Component Repair
- Parts Delivery
- Product Support Data
- Warranty
- Technical Resolution
Component Removal/Reliability Metrics

- **Mean Between Removal/Mean Cycles Between Removal (MTBR/MCBR)**
  - A performance figure calculated by dividing the operating time, or total unit flying cycles, accrued in a period by the number of unit removals (scheduled plus unscheduled) that occurred during the same period. Specified in hours.

- **Mean Time Between Unscheduled Removal/Mean Cycles Between Unscheduled Removal (MTBUR/MCBUR)**
  - A performance figure calculated by dividing the total unit flying hours accrued ((Quantity per aircraft) times (Flying Hours or Cycles)) in a period by the number of unscheduled unit removals that occurred during the same period.

- **Mean Time Between Failure/Mean Cycle Between Failure (MTBF/MCBF)**
  - A performance figure calculated by dividing the total unit flying hours accrued ((Quantity per Aircraft) times (Flying hours or cycles)) in a period by the number of confirmed unit failures that occurred during the same period.

- **No Fault Found Rate**
  - A performance figure calculated by dividing the total units returned to the shop with no confirmed defect by the total number of units returned to the shop. This is a percentage of units determined to be no fault found out of the whole population of units removed during the same period.
Component Repair Metrics

Repair agency (a more general term for supplier) – includes OEM, 3rd party, etc

- **Repair Agency Processing Time**
  - The amount of time a repair agency takes to repair a returned part, as measured from the date of part receipt to the date part shipped. Measured in calendar days. Including all repair process codes.

- **Adjusted Repair Agency Processing Time**
  - The amount of time a repair agency takes to repair a returned part, as measured from the date of part receipt to the date part shipped excluding customer hold time (date of customer notification of hold through date of customer release from hold). Measured in calendar days. Including all repair process codes

- **Performance to Repair Agency Processing Time Commitment**
  - The percentage of orders that are less than or equal to the Repair Agency Processing Time commitment. Including all process type codes
Parts Delivery Metrics

- **Performance to Lead time**
  - Supplier performance to Lead Time, or to customer Specified Shipping date for a given reporting period, whichever is later. Canceled orders are excluded. Reported as a percentage.

- **Performance to Specified Shipping Date**
  - Supplier performance to customer Specified Shipping Data for a given reporting period, excluding cancelled orders or orders for initial provisioning. Reported as a percentage.
Product Support Data Metric

- **Revision Activity**
  - Timeliness of product support data revisions: the percentage of changes that have been incorporated into the product support document. The metric can be calculated to provide supplier performance using all of the supplier’s product support data or by just one type of product data.

**Data Acceptability is a quality measure and needs to be incorporated into a supplier’s quality control system.**
Warranty Metrics

- **Average Warranty claim response time**
  - Average time warranty claim is processed (accepted, denied or rejected) by warrantor in calendar days over a mutually agreed period.

- **First time claim resolution rate**
  - To measure the percentage of claims resolved by warrantor in initial response – Plot point provides the percentage of new warranty claims that are completed on initial submittal.

- **Disputed claims response time**
  - To measure the processing time by a warrantor of a disputed claim – Plot shows the number of days required to complete the resolution of disputed claims.

- **Warranty claim return rate**
  - Measure the percentage of claims that are Returned due to invalid or incomplete data to identify process issues at claimant – Plot point shows the percentage of warranty claims that are returned without action because of incomplete information or invalid content.
Technical Resolution Metrics

- **Overall Cycle Time for Technical Issue Resolution**
  - Initial time in days to gather data related to the reported event and to identify reported event root causes – OEM and Airlines shared responsibility

- **Cycle time for technical solution study**
  - Time in days to define the technical solution – OEM responsibility

- **Cycle time for technical solution embodiment**
  - Time in days to implement solution – Airline responsibility
Chapter 13 - Performance Metric Standards

Purpose

The assumptions, parameters and definitions for performance metrics outlined in this document will establish a standard for measuring key processes in the aerospace industry. These performance metric standards support contractual requirements, business needs, and ensure simplicity and consistency in the industry.

The processes this chapter will address are:

- Parts Delivery
- Warranty
- Component Repair
- Component Removal/Reliability
- Product Support Data
- Technical Resolution
Next Steps

- Work closely with the Aerospace Industry to ensure completion of the new chapter
  - Next meeting first week of February
- Work with trading partners to incorporate this new standard